



LETTER OF TRANSMITTAL

PIPELINE CONTRACTORS

8600 Verbena St.
Commerce City, CO 80022
Office 303-289-4355
Fax 303-289-4353

ISSUED TO:

Owner ATTN: Owner Representative

DATE:

REGARDING:

TRANSMITTAL NO.:

Project JBS Job No 0210

We are issuing you under separate cover the following (via):

- Blue Prints
- Submittals
- Change Order
- Request for Information
- Copy of a letter
- Shop Drawings

#	Copies	Item Dated	Item #	Description
	1-Electronic		A-009	Concrete for Manholes and Thrust Blocks
				Supplier 1

- For your bid
- For Approval
- As Requested
- Returned for Correction
- For Review and Comment
- For Pricing

Prints are loaned to you and are to be returned to us by: Date: _____

Bids are due on or before: Date: _____

COMMENTS

JBS will try to have multiple suppliers in order to allow for availability when we need it.

CC:

Amie Parent

Amie Parent
JBS Pipeline Contractors

West Central Region Office

1707 Cole Boulevard, Suite 100

Golden, Colorado 80401

Telephone: (303) 985-1070

Facsimile: (303) 716-5318

To Order: 303.744.2378



Project Mix Designs

Date: 8/8/2019

Contractor: JBS PIPELINE CONTRACTORS

Attention:

Project: DR HORTON F2 & F3

Location:

Mix	Usage	Mix Number	f 'c	w/c+p	Slump	Air
1	DOUGLAS COUNTY HAND MIX	7454120.	4500	0.41	3.00 - 5.00"	5.0 - 7.0%
2	DOUGLAS COUNTY MACHINE MIX	7454122.	4500	0.38	1.00 - 3.00"	4.0 - 8.0%
3	FLOWFILL - PUMPABLE	1009800.	100	1.06	7.00 - 11.00"	5.0 - 8.0%

**IF FIBERS OR COLOR ARE REQUIRED IN THE MIX,
IT MUST BE SPECIFIED WHEN ORDERING!**

Sales Representative:

Main Plant: 925

ACI 301-10 1.6.4.1.c: Testing agency will report all tests and inspection results to Architect/Engineer, Contractor, and Concrete supplier within seven days after tests and inspections are performed.

Please forward results to:

Aggregate Industries

Attention: Stephen Herald

1705 S. Acoma

Denver, Colorado 80223

CONCRETE MIX DESIGN SUBMITTAL

Contractor: JBS PIPELINE CONTRACTORS
Project Name DR HORTON F2 & F3
Mix I.D.: 7454120.
Qualification: ACI 301-10 4.2.3.2.a
Intended Use: DOUGLAS COUNTY HAND MIX

PROPORTIONS

	1 cu.yd. (SSD)	
ASTM C150 Type I-II	559 LBS.	
ASTM C618 Fly Ash	99 LBS.	
ASTM C33 Coarse Aggregate	1775 LBS.	
ASTM C33 Fine Aggregate	1175 LBS.	
ASTM Potable Water	270 LBS.	32.41 gal/cy
ASTM C260 Air Entrainer	0.50 oz/cwt C+P	3.29 oz/cy
ASTM C494 Type A Water Reducer	3.0 oz/cwt C+P	19.74 oz/cy
ASTM C494 Type F High Range Water Reduc	2.8 oz/cwt C+P	18.42 oz/cy

PHYSICAL PROPERTIES

Slump: 3.00 - 5.00"
Air Content: 5.0 - 7.0%
w/c + p ratio: 0.41

COMPRESSIVE STRENGTH

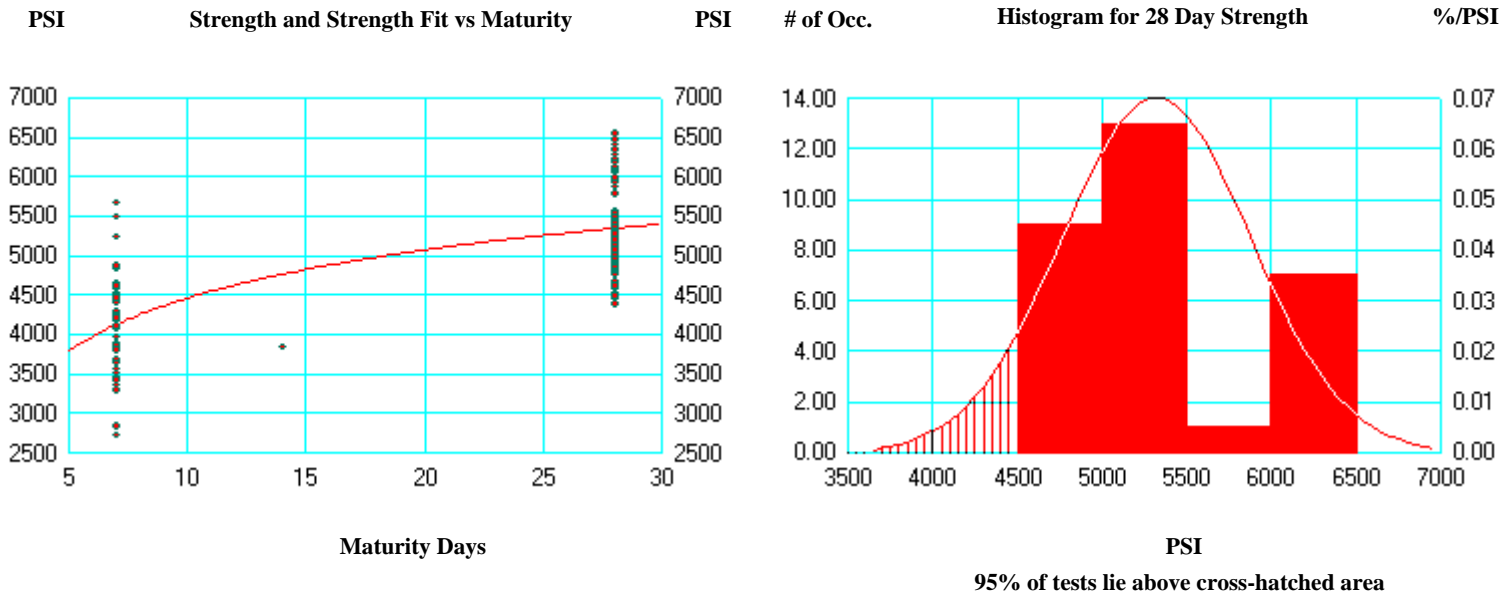
$f'c =$ 4,500 psi @ 28 days

Production and delivery in accordance with ASTM C 94 Standard Specification for Ready-Mixed Concrete. Compressive strength performance is conditional with strict adherence to the current ASTM Standards relating to concrete, and the latest revisions of ACI 301 and 318.

Please direct inquiries to:
Stephen Herald
Quality Control Manager, Concrete
Phone: 303-777-3052
Fax: 303-744-2062
stephen.herald@aggregate-us.com



Units : US



Mix Name: 7454120.

Mix Strength: 4,500 PSI at 28.0 Days

STRENGTH SUMMARY, Compression 4" x 8"
Strengths

No. Of Tests	Avg Slump	Avg Air	Avg 7 Day	Avg 28 Day	Avg Acc Age	Accept Age	Std Dev	ACI318 Req'd
30	4.26	6.01	4110	5320	5320	28	550	5290

DETAILED STRENGTH, Compression 4" x 8"

Batch Number	Date	Slump	Air	Strengths 7 Day	Strengths 28 Day	Acc Age	Age
61987677	8/3/2017	5.00	7.00	4240	5460	5460	28
59511683	8/3/2017	5.00	6.80	3460	5200	5200	28
61988661	9/7/2017	3.50	5.20	4650	6070	6070	28
62261017	10/27/2017	3.50	5.60	3310	4570	4570	28
61990460	11/1/2017	4.00	7.60	3680	5140	5140	28
61991708	11/30/2017	5.00	5.10	4610	6000	6000	28
61991713	12/1/2017	5.00	6.00	3520	5020	5020	28
61992346	12/15/2017	6.00	6.80	3430	4850	4850	28
61992923	1/19/2018	3.00	5.80	3640	5030	5030	28
61992970	1/24/2018	3.00	5.20	4650	6220	6220	28
6226625	4/4/2018	6.00	5.10	2790	4600	4600	28
61995029	4/18/2018	4.00	5.50	3830	5090	5090	28
62268352	6/8/2018	3.50	6.80	4230	5420	5420	28
62268323	6/8/2018	4.00	7.00	4250	5480	5480	28
61997538	7/31/2018	3.00	6.50	4440	6060	6060	28
67628999	8/8/2018	4.00	6.50	3790	4940	4940	28

DETAILED STRENGTH, Compression 4" x 8"

Batch Number	Date	Slump	Air	Strengths			Acc Age
				7 Day	28 Day	Acc Age	
61997908	8/14/2018	4.00	6.80	3990	5180	5180	28
84583987	8/14/2018	4.50	7.40	3340	4550	4550	28
67629315	8/16/2018	4.00	5.90	4250	4900	4900	28
67629369	8/17/2018	4.25	6.40	3440	4670	4670	28
61997960	8/20/2018	4.50	5.90	4210	6160	6160	28
61998379	9/4/2018	4.25	6.00	4640	4810	4810	28
61998441	9/7/2018	4.00	6.20	4050	4780	4780	28
62273249	9/18/2018	4.00	5.10	4570	5330	5330	28
84585569	10/11/2018	3.00	5.00	5590	6390	6390	28
67633000	11/21/2018	4.00	6.80	4110	5090	5090	28
62280376	4/2/2019	4.25	7.00	4450	5430	5430	28
86184697	4/9/2019	5.00	5.00	4680	5620	5620	28
86185189	5/1/2019	6.50	2.00	5240	6330	6330	28
62281847	5/1/2019	4.00	6.20	4220	5210	5210	28



CONCRETE MIX DESIGN SUBMITTAL

Contractor: JBS PIPELINE CONTRACTORS
Project Name DR HORTON F2 & F3
Mix I.D.: 7454122.
Qualification: ACI 301-10 4.2.3.2.a
Intended Use: DOUGLAS COUNTY MACHINE MIX

PROPORTIONS

	1 cu.yd. (SSD)	
ASTM C150 Type I-II	561 LBS.	
ASTM C618 Fly Ash	99 LBS.	
ASTM C33 Coarse Aggregate	1780 LBS.	
ASTM C33 Fine Aggregate	1159 LBS.	
ASTM Potable Water	251 LBS.	30.05 gal/cy
ASTM C260 Air Entrainer	1.48 oz/cwt C+P	9.75 oz/cy
ASTM C494 Type A Water Reducer	5.0 oz/cwt C+P	33.00 oz/cy

PHYSICAL PROPERTIES

Slump: 1.00 - 3.00"
Air Content: 4.0 - 8.0%
w/c + p ratio: 0.38

COMPRESSIVE STRENGTH

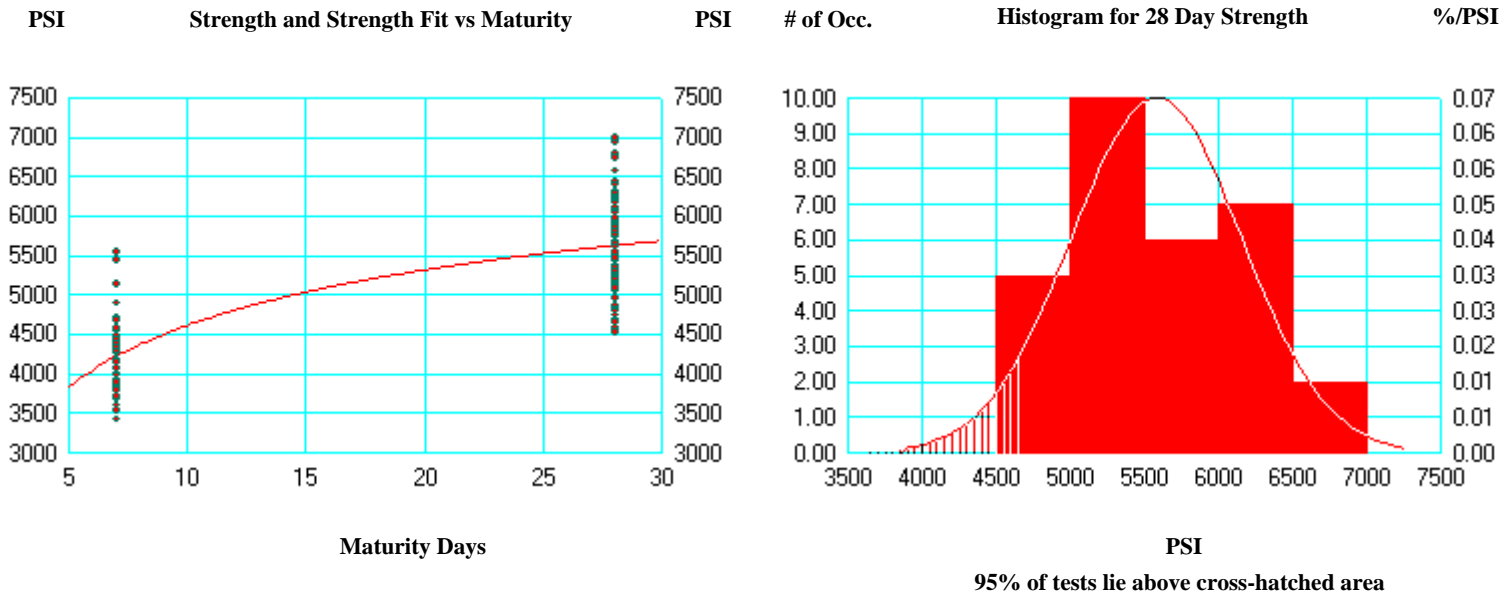
$f'c =$ 4,500 psi @ 28 days

Production and delivery in accordance with ASTM C 94 Standard Specification for Ready-Mixed Concrete. Compressive strength performance is conditional with strict adherence to the current ASTM Standards relating to concrete, and the latest revisions of ACI 301 and 318.

Please direct inquiries to:
Stephen Herald
Quality Control Manager, Concrete
Phone: 303-777-3052
Fax: 303-744-2062
stephen.herald@aggregate-us.com



Units : US



Mix Name: 7454122.

Mix Strength: 4,500 PSI at 28.0 Days

STRENGTH SUMMARY, Compression 4" x 8"
Strengths

No. Of Tests	Avg Slump	Avg Air	Avg 7 Day	Avg 28 Day	Avg Acc Age	Accept Age	Std Dev	ACI318 Req'd
30	1.60	6.03	4250	5580	5580	28	570	5340

DETAILED STRENGTH, Compression 4" x 8"

Batch Number	Date	Slump	Air	Strengths 7 Day	Strengths 28 Day	Acc Age	Age
62089164	7/6/2017	1.00	6.50	3700	5110	5110	28
75937012	7/11/2017	0.75	5.10	4010	5930	5930	28
75937046	7/12/2017	0.50	5.00	4050	5940	5940	28
75937086	7/13/2017	0.50	5.00	4250	6070	6070	28
75937189	7/15/2017	0.50	5.00	4320	5630	5630	28
62090206	7/28/2017	1.00	7.00	4490	5130	5130	28
82218309	8/15/2017	1.25	5.90	3920	5340	5340	28
75938035	8/15/2017	1.50	5.70	4240	5870	5870	28
62091758	8/30/2017	3.00	5.00	4560	5270	5270	28
75939146	9/15/2017	1.25	6.80	4240	6050	6050	28
59513643	9/19/2017	3.00	6.00	5150	6610	6610	28
75939288	9/20/2017	1.25	6.00	4100	5790	5790	28
75939626	9/29/2017	1.00	5.70	4090	5490	5490	28
59514908	10/25/2017	2.50	6.80	4310	5580	5580	28
59514972	10/26/2017	2.50	6.90	5550	5410	5410	28
75941509	11/27/2017	2.00	5.20	3640	5150	5150	28

DETAILED STRENGTH, Compression 4" x 8"

Batch Number	Date	Slump	Air	Strengths			Acc Age
				7 Day	28 Day	Acc Age	
75941576	11/28/2017	1.75	5.50	4360	6760	6760	28
62096902	1/12/2018	1.75	6.10	3950	6070	6070	28
82220055	2/8/2018	3.00	7.60	4440	6090	6090	28
62408616	3/15/2018	2.00	6.30		5200	5200	28
62266885	5/7/2018	1.25	5.10	5450	6430	6430	28
62267351	5/17/2018	1.50	5.00	4590	6100	6100	28
62267410	5/18/2018	2.75	6.60	3430	4980	4980	28
61997832	8/10/2018	0.75	6.10	3640	4830	4830	28
62107898	9/27/2018	2.00	5.00	3610	4670	4670	28
61999422~	10/19/2018	2.00	6.00	3800	4600	4600	28
61999437	10/19/2018	2.00	7.80	3830	4690	4690	28
61999510	10/23/2018	2.00	6.00	4160	5230	5230	28
86182197	11/12/2018	0.75	6.80	4800	6000	6000	28
86182348	11/20/2018	1.00	7.50	4450	5450	5450	28

CONCRETE MIX DESIGN SUBMITTAL

Contractor: JBS PIPELINE CONTRACTORS
Project Name DR HORTON F2 & F3
Mix I.D.: 1009800.
Qualification: ACI 301-10 4.2.3.2.a
Intended Use: FLOWFILL - PUMPABLE

PROPORTIONS

	1 cu.yd. (SSD)	
ASTM C150 Type I-II	100 LBS.	
ASTM C618 Fly Ash	300 LBS.	
ASTM C33 Fine Aggregate	2638 LBS.	
ASTM Potable Water	426 LBS.	51.02 gal/cy
ASTM C260 Air Entrainer	0.60 oz/cwt C+P	2.40 oz/cy
ASTM C494 Type F High Range Water Reduc	2.5 oz/cwt C+P	10.00 oz/cy

PHYSICAL PROPERTIES

Slump: 7.00 - 11.00"
Air Content: 5.0 - 8.0%
w/c + p ratio: 1.06

COMPRESSIVE STRENGTH

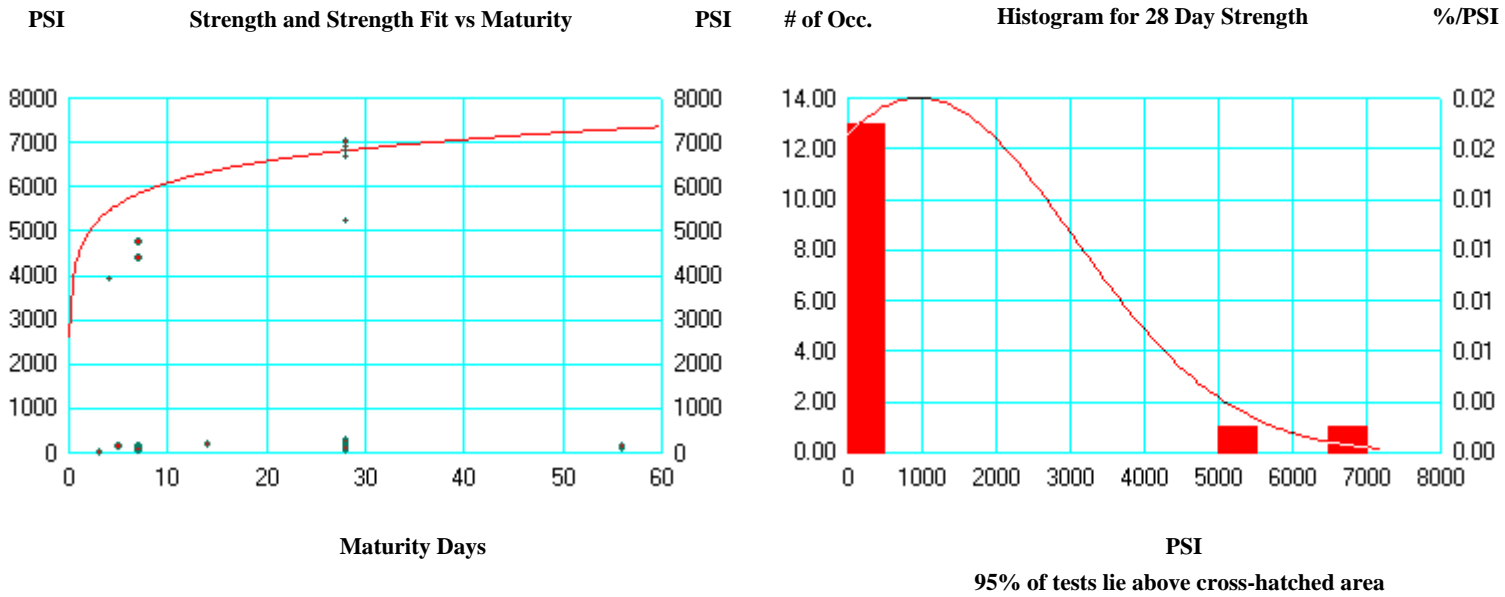
$f'c =$ 100 psi @ 28 days

Production and delivery in accordance with ASTM C 94 Standard Specification for Ready-Mixed Concrete. Compressive strength performance is conditional with strict adherence to the current ASTM Standards relating to concrete, and the latest revisions of ACI 301 and 318.

Please direct inquiries to:
Stephen Herald
Quality Control Manager, Concrete
Phone: 303-777-3052
Fax: 303-744-2062
stephen.herald@aggregate-us.com



Units : US



Mix Name: 1009800.

Mix Strength: 100 PSI at 28.0 Days

STRENGTH SUMMARY, Compression 4" x 8"
Strengths

No. Of Tests	Avg Slump	Avg Air	Avg 7 Day	Avg 28 Day	Avg Acc Age	Accept Age	Std Dev	ACI318 Req'd
15	7.97	5.91	760	960	960	28	1390	3370

DETAILED STRENGTH, Compression 4" x 8"

Batch Number	Date	Slump	Air	Strengths 7 Day	Strengths 28 Day	Acc Age	Age
72173501	2/16/2010	10.50	13.00	40	80	80	28
70848406	11/9/2010	7.00		150	250	250	28
70849002	11/23/2010	10.00	3.00		140	140	28
70850262	12/30/2010	11.00	1.00	160	180	180	28
70177511	6/6/2011	8.00		170	180	180	28
70178536	6/22/2011	8.00		100	170	170	28
70855914	6/30/2011	9.00		110	250	250	28
70179785	7/14/2011	9.00		70	110	110	28
70179864	7/15/2011	5.50		130	220	220	28
70180213	7/20/2011	7.25	4.50	150	270	270	28
70180243	7/21/2011	9.25		130	180	180	28
70181361	8/5/2011	10.00		140	170	170	28
62030345	7/30/2013	4.00	6.50	4410	5240	5240	28
62132728	1/15/2014	8.00	7.40	90	120	120	28
67583068	8/5/2015	3.00	6.00	4760	6860	6860	28



Material: Portland Cement
Type: I-II

Material Certification Report

Test Period: 01-Apr-2019 to 30-Apr-2019
Date Issued: 06-May-2019

Certification

This cement meets the specifications of ASTM C150 and AASHTO M85 for Type I-II cement.

General Information

Supplier: Holcim (US) Inc. d/b/a LafargeHolcim US	Source Location: Portland Plant
Address: 8700 West Bryn Mawr Ave Chicago, IL 60631	3500 Highway 120 Florence, CO 81226
Contact:	Contact: Kevin Tate / (719) 371-4615

The following is based on average test data during the test period. The data is typical of product shipped from this source; individual shipments may vary.

Test Data on ASTM Standard Requirements

Chemical			Physical		
Item	Limit ¹	Result	Item	Limit ¹	Result
SiO ₂ (%)	-	20.5	Air Content (%)	12 max	8
Al ₂ O ₃ (%)	6.0 max	4.3	Blaine Fineness (m ² /kg)	260 min	426
Fe ₂ O ₃ (%)	6.0 max	3.3	Autoclave Expansion (%) (C151)	0.80 max	0.01
CaO (%)	-	63.6	Compressive Strength MPa (psi)		
MgO (%)	6.0 max	1.3	1 day	-	22.6 (3280)
SO ₃ (%) ²	3.0 max	3.4	3 day	10.0 (1450) min	34.2 (4960)
Loss on Ignition (%) ⁵	3.5 max	2.6	7 day	17.0 (2470) min	38.6 (5600)
Insoluble Residue (%)	1.50 max	1.04	28 day (previous month's data)	-	44.3 (6430)
CO ₂ (%)	-	1.6	Initial Vicat (minutes)	45-375	113
CaCO ₃ in Limestone (%)	70 min	81	Mortar Bar Expansion (%) (C1038)	0.020 max	0.011
Potential Phase Compositions ³ :					
C ₃ S (%)	-	56			
C ₂ S (%)	-	15			
C ₃ A (%)	8 max	6			
C ₄ AF (%)	-	10			
C ₃ S + 4.75C ₃ A (%)	-	83			

Test Data on ASTM Optional Requirements

Chemical			Physical		
Item	Limit ¹	Result	Item	Limit ¹	Result
Equivalent Alkalies (%)	-	0.74	Heat of Hydration kJ/kg (cal/g) (ASTM C1702) 3 Days ⁴	-	300 (72)

Notes (*1-9)

- 1 - Dashes in the Limit / Result columns mean Not Applicable.
- 2 - It is permissible to exceed the specification limit provided that ASTM C1038 Mortar Bar Expansion does not exceed 0.020% at 14 days.
- 3 - Adjusted per Annex A1.6 of ASTM C150 and AASHTO M85.
- 4 - Test results represent the most recent value and is provided for information only.
- 5 - Limit = 3.0 when limestone is not an ingredient in the final cement product

Additional Data

Item	Limestone	Inorganic Processing Addition	Base Cement Phase Composition	Result
Amount (%)	4.6	-	C ₃ S (%)	59
SiO ₂ (%)	11.8	-	C ₂ S (%)	15
Al ₂ O ₃ (%)	3.0	-	C ₃ A (%)	6
Fe ₂ O ₃ (%)	1.3	-	C ₄ AF (%)	10
CaO (%)	43.8	-		
SO ₃ (%)	0.5	-		

ASTM C618 / AASHTO M295 Testing of Prairie State Fly Ash

Sample Date: 3/2 - 3/15/19
Sample Type: composite
Sample ID:

Report Date: 4/26/2019
MTRF ID: 1330PS

Chemical Analysis	Results	ASTM Limit Class F/C	AASHTO Limit Class F/C
Silicon Dioxide (SiO ₂)	<u>53.45</u> %		
Aluminum Oxide (Al ₂ O ₃)	<u>17.61</u> %		
Iron Oxide (Fe ₂ O ₃)	<u>11.38</u> %		
Sum (SiO ₂ +Al ₂ O ₃ +Fe ₂ O ₃)	<u>82.44</u> %	70.0/50.0 min	70.0/50.0 min
Sulfur Trioxide (SO ₃)	<u>1.16</u> %	5.0 max	5.0 max
Calcium Oxide (CaO)	<u>7.03</u> %		
Magnesium Oxide (MgO)	<u>1.48</u> %		
Sodium Oxide (Na ₂ O)	<u>1.17</u> %		
Potassium Oxide (K ₂ O)	<u>2.65</u> %		
Sodium Oxide Equivalent (Na ₂ O+0.658K ₂ O)	<u>2.91</u> %		
Moisture	<u>0.04</u> %	3.0 max	3.0 max
Loss on Ignition	<u>0.77</u> %	6.0 max	5.0 max
Physical Analysis			
Fineness, % retained on 45-µm sieve	<u>25.66</u> %	34 max	34 max
Fineness Uniformity	<u>3.71</u> %	±5 max	±5 max
Strength Activity Index - 7 or 28 day requirement			
7 day, % of control	<u>76</u> %	75 min	75 min
28 day, % of control	<u>83</u> %	75 min	75 min
Water Requirement, % control	<u>94</u> %	105 max	105 max
Autoclave Soundness	<u>0.01</u> %	0.8 max	0.8 max
Density	<u>2.36</u>		
Density Uniformity	<u>3.44</u> %	±5 max	±5 max

The test data listed herein was generated by applicable ASTM methods. The reported results pertain only to the sample(s) or lot(s) tested. This report cannot be reproduced without permission from Boral Resources.


Doug Rhades, CET
Facility Manager



January 31, 2019

Aggregate Industries
1705 S. Acoma Street
Denver, CO 80223

Attention: Mr. John Cheever

Subject: Laboratory Test Results
Morrison Quarry Aggregate Tests
ASTM & AASHTO Size No. 57/67 Coarse Aggregate
ASTM & AASHTO Size No. 4 Coarse Aggregate
WesTest Project No. 633219

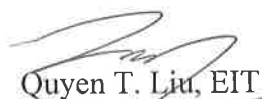
Gentlemen:

Enclosed on Tables 1 and 2 are the results of aggregate physical property and quality tests, done in general accordance with ASTM and AASHTO criteria, on aggregate sampled from the above-referenced source on January 14, 2019.

The test results indicate the material meets ASTM C33, *Standard Specification for Concrete Aggregates*, AASHTO M 80, *Standard Specification for Coarse Aggregate for Hydraulic Cement Concrete* and Colorado Department of Transportation requirements for the properties tested.

If you have any questions on the data presented, please contact us at your convenience.

Sincerely,
WesTest


Quyen T. Liu, EIT



Reviewed by:

Dylan A. Hullinger, P.E.

LABORATORY TEST REPORT



627 Sheridan Boulevard • Lakewood, CO 80214
303.975.9959 • office@westest.net

CLIENT: Aggregate Industries
SOURCE: Morrison Quarry
SAMPLED BY: Client
PROJECT: Morrison Quarry Aggregate Testing

WesTest PROJECT NO.: 633219
REPORT DATE: January 31, 2019

MATERIAL DESCRIPTION	ASTM & AASHTO Size No. 57/67 Coarse Aggregate
DATE SAMPLED	January 14, 2019
SAMPLE LOCATION	Stockpile

Aggregate Physical Property and Quality Tests (ASTM C33 & AASHTO M 80 Specifications)

ASTM C117 & C136, AASHTO T 11 & T 27				ASTM C127, AASHTO T 85, Bulk Specific Gravity = 2.647, Bulk Specific Gravity (SSD) = 2.662, Apparent Specific Gravity = 2.688, Absorption = 0.6%				ASTM C88, AASHTO T 104, Magnesium/Sodium Sulfate Soundness, 5 Cycles							
SIEVE SIZE	% Passing	Size No. 57 Specification	Size No. 67 Specification	ASTM C131, AASHTO T 96, L.A. Abrasion Grading B, Loss = 24% Specification: 45% Max.				SIEVE SIZE	GRADING OF ORIGINAL SAMPLE	WEIGHT BEFORE TEST, g		PERCENT PASSING AFTER TEST		WEIGHTED PERCENT LOSS	
										Mag.	Sod.	Mag.	Sod.	Mag.	Sod.
1-1/2"	100	100						1-1/2" to 1"	10			0.9	1.4	0.1	0.1
1"	100	95 - 100	100					1" to 3/4"		512.2	506.5				
3/4"	91		90 - 100					3/4" to 1/2"	67	672.5	669.8	2.6	1.8	1.7	1.2
1/2"	43	25 - 60						1/2" to 3/8"		328.4	329.6				
3/8"	28		20 - 55					3/8" to No.4	23	301.6	301.9	4.3	1.4	1.0	0.3
# 4	6	0 - 10	0 - 10					TOTAL	100	COARSE AGG. TOTAL 94%				3	2
# 8	3	0 - 5	0 - 5					SPECIFICATION:						18 Max.	12 Max.
# 16	2			SAMPLE WT. (g)	LIQUID TYPE / SPECIFIC GRAVITY	LIGHTWEIGHT PARTICLES	SPEC.	ASTM C29, AASHTO T 19, Bulk Density and Voids in Aggregate							
# 30	2			3057.4	ZnCl ₂ /2.0	0.0%	0.5% Max.	Rodding Method; Bulk Density = 99 pcf							
# 50	2			3057.4	ZnBr ₂ /2.4	0.0%	3.0% Max.	Voids in Aggregate = 40%							
# 100	2							Sum of Clay Lumps, Friable Particles, Chert = 0.0%							
# 200	1.4	0 - 1.5	0 - 1.5					Specification: 3.0% Max.							
COMMENTS															

TABLE 1

January 31, 2019

Aggregate Industries
1705 S. Acoma Street
Denver, CO 80223

Attention: Mr. John Cheever

Subject: Laboratory Test Results
ASTM C1260
Potential Alkali Reactivity of Aggregates (Mortar-Bar Method)
ASTM & AASHTO Size No. 57/67 Coarse Aggregate
ASTM & AASHTO Size No. 4 Coarse Aggregate
Morrison Quarry
WesTest Project No. 633219

Gentlemen:

Included as Figure 1 is the result of potential alkali reactivity testing (mortar-bar method), performed on aggregate sampled from the above-referenced source on January 14, 2019. The aggregate was prepared and tested in general accordance with ASTM Procedures. ASTM C1260 defines the potential of an aggregate for deleterious expansion as follows:

<u>Test Expansion</u>	<u>Classification</u>	<u>Potential for Deleterious ASR</u>
< 0.10%	Innocuous	Low
0.10% to 0.20%	Inconclusive	Not Predictable
> 0.20%	Deleterious	High

Based on the test result of 0.05% expansion at 14 days in solution, 16 days after casting, the potential for deleterious alkali-silica behavior of this aggregate in concrete is considered Low.

If you have any questions on the data presented, please contact us at your convenience.

Sincerely,
WesTest


Quyen T. Liu, EIT



Reviewed by:

Dylan A. Hullinger, P.E.



627 Sheridan Boulevard • Lakewood, CO 80214
303.975.9959 • office@westest.net

LABORATORY TEST REPORT
POTENTIAL ALKALI REACTIVITY OF AGGREGATES
(MORTAR-BAR METHOD)

ASTM C1260

REPORT DATE: January 31, 2019

CLIENT: Aggregate Industries
PROJECT NO.: 633219

SAMPLE DATE: January 14, 2019
SAMPLE ID: 6332630

AGGREGATE:
SOURCE: Morrison Quarry
SIZE: ASTM & AASHTO Size No. 57/67 Coarse Aggregate
SIZE: ASTM & AASHTO Size No. 4 Coarse Aggregate
COMMENTS: Aggregate graded as per Section 8.2, Table 1

CEMENT:
SOURCE: Holcim
TYPE: I/II
AUTOCLAVE EXPANSION: -0.02%
ALKALIS CONTENT: 0.78% (as Na equivalent)
COMMENTS: Cement data provided by Holcim

MIX WATER:
W/C RATIO: 0.47

EFFECTIVE GAUGE LENGTH = 250 mm

Specimen	1/16/19	1/17/19	1/21/19		1/24/19		1/28/19		1/31/19	
	Initial	Zero	4 Days		7 Days		11 Days		14 Days	
	Comparator Reading	Comparator Reading	Comparator Reading	Length Change	Comparator Reading	Length Change	Comparator Reading	Length Change	Comparator Reading	Length Change
A	-0.700	-0.548	-0.532	0.01%	-0.490	0.02%	-0.444	0.04%	-0.426	0.05%
B	-1.464	-1.314	-1.300	0.01%	-1.256	0.02%	-1.214	0.04%	-1.192	0.05%
C	-0.030	0.124	0.138	0.01%	0.184	0.02%	0.232	0.04%	0.250	0.05%
AVERAGE		-0.579	-0.565	0.01%	-0.521	0.02%	-0.475	0.04%	-0.456	0.05%

MORTAR BAR EXPANSION

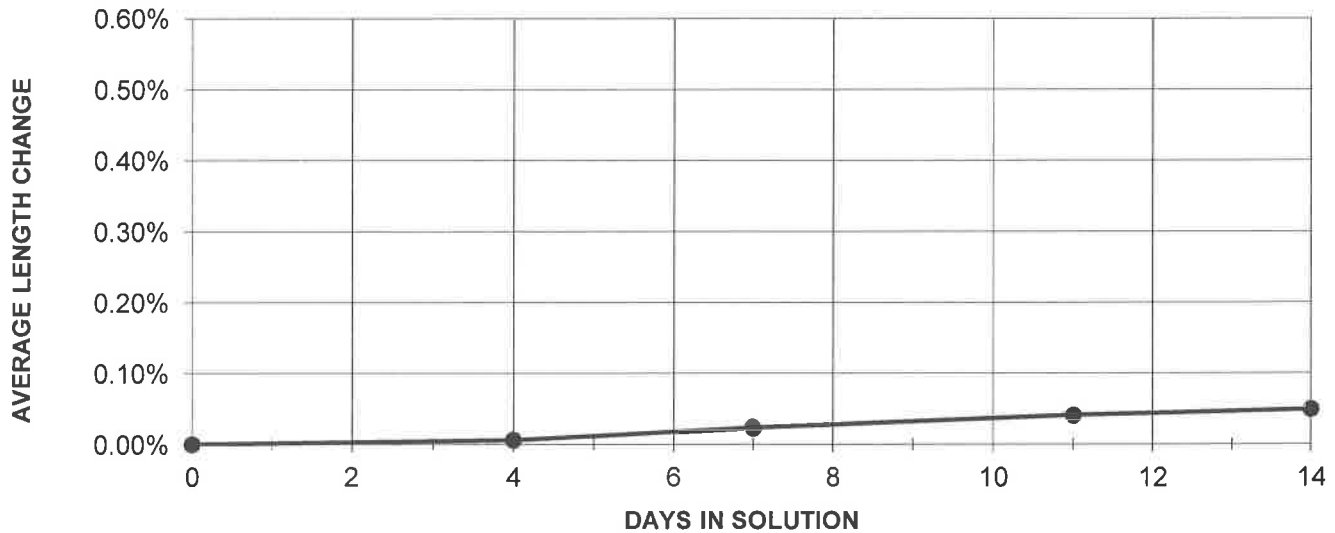


FIGURE 1

February 15, 2019

Aggregate Industries
1705 S. Acoma Street
Denver, CO 80223

Attention: Mr. John Cheever

Subject: Laboratory Test Results
Platte Valley Pit Aggregate Tests
ASTM & AASHTO Fine Aggregate
ASTM & AASHTO Natural Masonry Sand
ASTM & AASHTO Size No. 9 Coarse Aggregate, Squeegee
ASTM & AASHTO Size No. 8 Coarse Aggregate
ASTM & AASHTO Size No. 67 Coarse Aggregate
WesTest Project No. 631218

Gentlemen:

Enclosed on Tables 1 through 5 are the results of aggregate physical property and quality tests, done in general accordance with ASTM and AASHTO criteria, on aggregate sampled from the above-referenced source on January 7, 2019.

The test results indicate the material meets ASTM C33, *Standard Specification for Concrete Aggregates*, ASTM C144, *Standard Specification for Aggregate for Masonry Mortar*, AASHTO M 6, *Standard Specification for Fine Aggregate for Hydraulic Cement Concrete*, AASHTO M 80, *Standard Specification for Coarse Aggregate for Hydraulic Cement Concrete*, AASHTO M 45, *Standard Specification for Aggregate for Masonry Mortar* and Colorado Department of Transportation requirements for the properties tested.

If you have any questions on the data presented, please contact us at your convenience.

Sincerely,
WesTest


Dylan A. Hullinger, P.E.



Reviewed by:

Dylan A. Hullinger, P.E.

LABORATORY TEST REPORT



527 Sheridan Boulevard • Lakewood, CO 80214
303 975.9959 • office@westest.net

CLIENT: Aggregate Industries
SOURCE: Platte Valley Pit
SAMPLED BY: Client
PROJECT: Platte Valley Pit Aggregate Testing

WesTest PROJECT NO.: 631218
REPORT DATE: February 15, 2019

MATERIAL DESCRIPTION	ASTM & AASHTO Fine Aggregate
DATE SAMPLED	January 7, 2019
SAMPLE LOCATION	Stockpile

Aggregate Physical Property and Quality Tests (ASTM C33, AASHTO M 6 Specifications)

ASTM C117 & C136, AASHTO T 11 & T 27				ASTM C128, AASHTO T 84, Bulk Specific Gravity = 2.610, Bulk Specific Gravity (SSD) = 2.628, Apparent Specific Gravity = 2.656, Absorption = 0.7%				ASTM C88, AASHTO T 104, Sodium Sulfate Soundness, 5 Cycles				
SIEVE SIZE	% Passing	ASTM C33 Spec.	AASHTO M 6 Spec.					SIEVE SIZE	GRADING OF ORIGINAL SAMPLE	WEIGHT BEFORE TEST, g	PERCENT PASSING AFTER TEST	WEIGHTED PERCENT LOSS
1"				ASTM D2419, AASHTO T 176, Sand Equivalent Value = 91 Specification: 80 Min. (CDOT)				Minus #100	4			
3/4"								# 50 to # 100	10			
1/2"								# 30 to # 50	23	100.0	3.5	0.8
3/8"	100	100	100	ASTM C142, AASHTO T 112, Clay Lumps & Friable Particles FINE AGG. = 0.0%, Specification: 3.0% Max.				# 16 to # 30	25	100.0	6.1	1.5
# 4	100	95 - 100	95 - 100					# 8 to # 16	28	100.0	3.1	0.9
# 8	90	80 - 100	80 - 100					# 4 to # 8	10	100.0	2.2	0.2
# 16	62	50 - 85	50 - 85	ASTM C123, AASHTO T 113, Lightweight Particles in Aggregate				3/8" to # 4	0			
# 30	37	25 - 60	25 - 60					TOTAL	100	FINE AGG. TOTAL 100%		3
# 50	14	5 - 30	10 - 30					SPECIFICATION:				10 Max.
# 100	4	0 - 10	2 - 10	SAMPLE WT. (g)	LIQUID TYPE / SPECIFIC GRAVITY	LIGHTWEIGHT PARTICLES	SPEC.	ASTM C40, AASHTO T 21, Organic Impurities: Less than Organic Plate No. 1 Specification: Organic Plate No. 3 or Less				
# 200	1.5	0 - 3.0	0 - 2.0	205.0	ZnCl ₂ /2.0	0.0%	0.25% Max.					
Fineness Modulus	2.91	2.3 - 3.1	2.3 - 3.1	205.0	ZnBr ₂ /2.4	0.0%	3.0% Max.					
COMMENTS:								ASTM C29, AASHTO T 19, Bulk Density and Voids in Aggregate Rodding Method; Bulk Density = 108 pcf Voids in Aggregate = 34%				

TABLE 1

February 8, 2019

Aggregate Industries
1705 S. Acoma Street
Denver, CO 80223

Attention: Mr. John Cheever

Subject: Laboratory Test Results
ASTM C1260
Potential Alkali Reactivity of Aggregates (Mortar-Bar Method)
ASTM & AASHTO Fine Aggregate
ASTM & AASHTO Natural Masonry Sand
ASTM & AASHTO Size No. 9 Coarse Aggregate
ASTM & AASHTO Size No. 8 Coarse Aggregate
ASTM & AASHTO Size No. 67 Coarse Aggregate
Platte Valley Pit
WesTest Project No. 631218

Gentlemen:

Included as Figures 1 through 3 are the results of potential alkali reactivity testing (mortar bar method), performed on aggregate sampled from the above-referenced source on January 7, 2019. The aggregate was prepared and tested in general accordance with ASTM Procedures. ASTM C1260 defines the potential of an aggregate for deleterious expansion as follows:

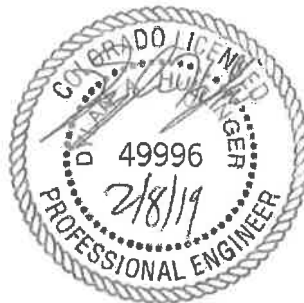
<u>Test Expansion</u>	<u>Classification</u>	<u>Potential for Deleterious ASR</u>
< 0.10%	Innocuous	Low
0.10% to 0.20%	Inconclusive	Not Predictable
> 0.20%	Deleterious	High

Based on the test results of 0.07%, 0.06% and 0.06% expansion at 14 days in solution, 16 days after casting, the potential for deleterious alkali-silica behavior of this aggregate in concrete is considered Low.

If you have any questions on the data presented, please contact us at your convenience.

Sincerely,
WesTest


Quyen T. Liu, EIT



Reviewed by:

Dylan A. Hullinger, P.E.



627 Sheridan Boulevard • Lakewood, CO 80214
303.975.9959 • office@westest.net

LABORATORY TEST REPORT
POTENTIAL ALKALI REACTIVITY OF AGGREGATES
(MORTAR-BAR METHOD)
ASTM C1260

REPORT DATE: February 8, 2019

CLIENT: Aggregate Industries
PROJECT NO.: 631218

SAMPLE DATE: January 7, 2019
SAMPLE ID: 6312J

AGGREGATE:
SOURCE: Platte Valley Pit
SIZE: ASTM & AASHTO Fine Aggregate
COMMENTS: Aggregate graded as per Section 8.2, Table 1

CEMENT:
SOURCE: Holcim
TYPE: I/II
AUTOCLAVE EXPANSION: -0.02%
ALKALIS CONTENT: 0.78% (as Na equivalent)
COMMENTS: Cement data provided by Holcim

MIX WATER:
W/C RATIO: 0.47

EFFECTIVE GAUGE LENGTH = 250 mm

Specimen	1/16/19	1/17/19	1/21/19		1/24/19		1/28/19		1/31/19	
	Initial	Zero	4 Days		7 Days		11 Days		14 Days	
	Comparator Reading	Comparator Reading	Comparator Reading	Length Change	Comparator Reading	Length Change	Comparator Reading	Length Change	Comparator Reading	Length Change
A	0.050	0.184	0.218	0.01%	0.246	0.02%	0.316	0.05%	0.364	0.07%
B	-0.164	-0.026	0.004	0.01%	0.038	0.03%	0.098	0.05%	0.146	0.07%
C	2.242	2.378	2.410	0.01%	2.438	0.02%	2.500	0.05%	2.546	0.07%
AVERAGE		0.845	0.877	0.01%	0.907	0.02%	0.971	0.05%	1.019	0.07%

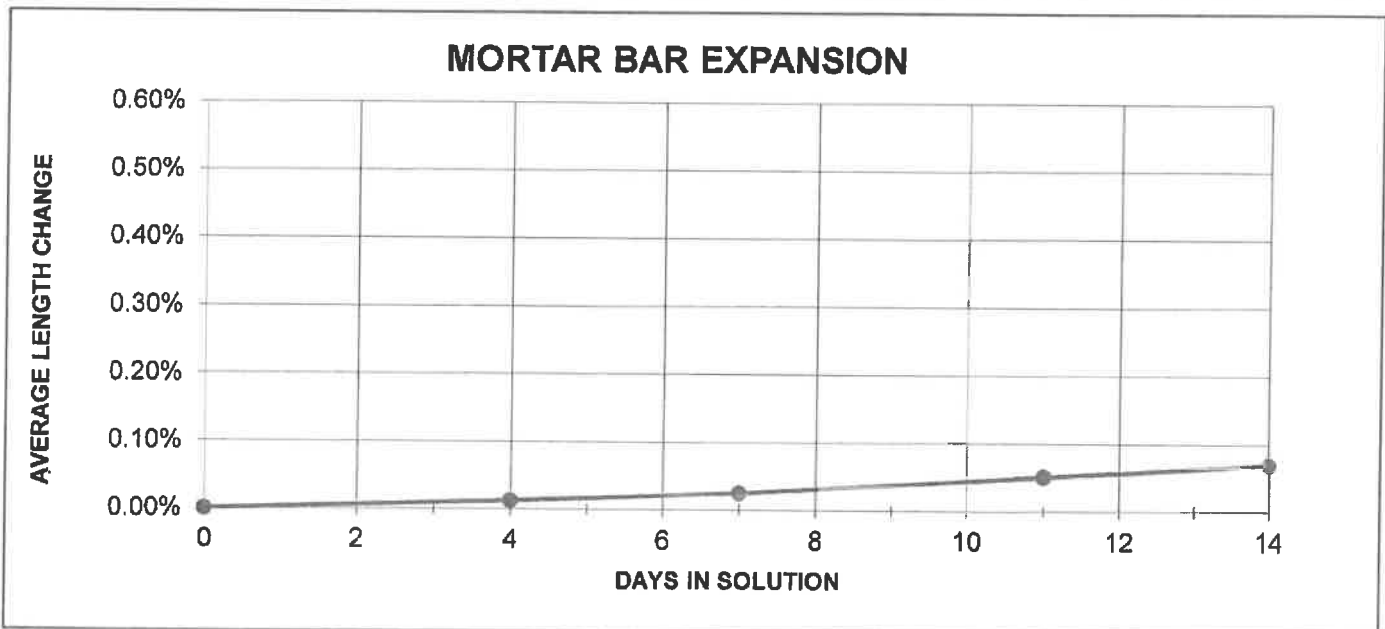


FIGURE 1



Sika Corporation · 201 Polito Avenue · Lyndhurst, NJ 07071 · USA

Mr. Stephen Herald
Quality Control Manager
Aggregate Industries
Denver, CO

CONTACT

Nathaniel Artman
Concrete Specialist
Phone: +1.330.495.0109
Mobile: +1.330.495.0109
artman.nathaniel@us.sika.com

RE: CERTIFICATE OF COMPLIANCE - SIKA AIR

January 15, 2019

This is to confirm that Sika AIR, air entraining admixture, conforms to the requirements of ASTM C 260/AASHTO M 154. This is also to confirm that Sika AIR is non-chloride based and does not contain any intentionally added chlorides during manufacturing. The measured chloride content is 30 ppm (0.0030%).

Sika AIR is manufactured under quality control conditions by Sika Corporation. Sika AIR exhibits the typical physical properties as stated in the current data sheet for the product found at Sika's website www.usa.sika.com when used as directed within the product's shelf life for one year from the date of installation. **Always read the current applicable product data sheet, safety data sheet and label prior to use.**

Results may differ based upon statistical variations depending upon mix design, mixing methods and equipment, temperature, application methods, test methods, actual site conditions and curing conditions.

NO OTHER WARRANTIES, EXPRESS OR IMPLIED, SHALL APPLY INCLUDING ANY WARRANTY OF MERCHANTABILITY OR FITNESS FOR A PARTICULAR PURPOSE. SIKA SHALL NOT BE LIABLE UNDER ANY LEGAL THEORY FOR SPECIAL OR CONSEQUENTIAL DAMAGES OF ANY KIND. SIKA SHALL NOT BE RESPONSIBLE FOR THE USE OF THIS PRODUCT IN A MANNER TO INFRINGE ON ANY PATENT OR ANY OTHER INTELLECTUAL PROPERTY RIGHTS HELD BY OTHERS.

Sincerely,

Nathaniel Artman, EI
Concrete Specialist

SIKA CORPORATION

201 Polito Avenue · Lyndhurst · NJ 07071 · USA
Phone: +1 201 933 8800 · Fax: +1 201 933 6225 · www.usa.sika.com



Sika Corporation · 201 Polito Avenue · Lyndhurst, NJ 07071 · USA

Mr. Stephen Herald
Quality Control Manager
Aggregate Industries
Denver, CO

CONTACT

Nathaniel Artman
Concrete Specialist
Phone: +1.330.495.0109
Mobile: +1.330.495.0109
artman.nathaniel@us.sika.com

RE: CERTIFICATE OF COMPLIANCE - SIKA VISCOCRETE-2100

January 15, 2019

This is to confirm that Sika ViscoCrete-2100, high range water reducing admixture, conforms to the requirements of ASTM C 494/AASHTO M 194, Type A & F. This is also to confirm that Sika ViscoCrete-2100 is non-chloride based and does not contain any intentionally added chlorides during manufacturing. The measured chloride content is 58 ppm (0.0058%).

Sika ViscoCrete-2100 is manufactured under quality control conditions by Sika Corporation. Sika ViscoCrete-2100 exhibits the typical physical properties as stated in the current data sheet for the product found at Sika's website www.usa.sika.com when used as directed within the product's shelf life for one year from the date of installation. **Always read the current applicable product data sheet, safety data sheet and label prior to use.**

Results may differ based upon statistical variations depending upon mix design, mixing methods and equipment, temperature, application methods, test methods, actual site conditions and curing conditions.

NO OTHER WARRANTIES, EXPRESS OR IMPLIED, SHALL APPLY INCLUDING ANY WARRANTY OF MERCHANTABILITY OR FITNESS FOR A PARTICULAR PURPOSE. SIKA SHALL NOT BE LIABLE UNDER ANY LEGAL THEORY FOR SPECIAL OR CONSEQUENTIAL DAMAGES OF ANY KIND. SIKA SHALL NOT BE RESPONSIBLE FOR THE USE OF THIS PRODUCT IN A MANNER TO INFRINGE ON ANY PATENT OR ANY OTHER INTELLECTUAL PROPERTY RIGHTS HELD BY OTHERS.

Sincerely,

Nathaniel Artman, El
Concrete Specialist

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Mr. Stephen Herald
Quality Control Manager
Aggregate Industries
Denver, CO

CONTACT

Nathaniel Artman
Concrete Specialist
Phone: +1.330.495.0109
Mobile: +1.330.495.0109
artman.nathaniel@us.sika.com

RE: CERTIFICATE OF COMPLIANCE - PLASTOCRETE 161

January 15, 2019

This is to confirm that Plastocrete 161, water reducing admixture, conforms to the requirements of ASTM C 494/AASHTO M 194, Type A, B & D. This is also to confirm that Plastocrete 161 is non-chloride based and does not contain any intentionally added chlorides during manufacturing. The measured chloride content is 175 ppm (0.0175%).

Plastocrete 161 is manufactured under quality control conditions by Sika Corporation. Plastocrete 161 exhibits the typical physical properties as stated in the current data sheet for the product found at Sika's website www.usa.sika.com when used as directed within the product's shelf life for one year from the date of installation. **Always read the current applicable product data sheet, safety data sheet and label prior to use.**

Results may differ based upon statistical variations depending upon mix design, mixing methods and equipment, temperature, application methods, test methods, actual site conditions and curing conditions.

NO OTHER WARRANTIES, EXPRESS OR IMPLIED, SHALL APPLY INCLUDING ANY WARRANTY OF MERCHANTABILITY OR FITNESS FOR A PARTICULAR PURPOSE. SIKA SHALL NOT BE LIABLE UNDER ANY LEGAL THEORY FOR SPECIAL OR CONSEQUENTIAL DAMAGES OF ANY KIND. SIKA SHALL NOT BE RESPONSIBLE FOR THE USE OF THIS PRODUCT IN A MANNER TO INFRINGE ON ANY PATENT OR ANY OTHER INTELLECTUAL PROPERTY RIGHTS HELD BY OTHERS.

Sincerely,

Nathaniel Artman, EI
Concrete Specialist

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Mr. Stephen Herald
Aggregate Industries

CONTACT

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Mobile: +1.330.495.0109
artman.nathaniel@us.sika.com

RE: COMPATIBILITY OF SIKA ADMIXTURES

March 10, 2017

This is to confirm the below admixtures are compatible.

Product	Description	ASTM Designation
Sika AIR	Air Entraining	ASTM C 260
Plastocrete-161	Water Reducing	ASTM C 494, Type A, B & D
Sika ViscoCrete-2100	High Range Water Reducing	ASTM C 494, Type A & F
SikaTard 440	Hydration Stabilizing	ASTM C 494, Type B & D
SikaSet NC	Set Accelerating	ASTM C 494, Type C & E
Sika Control 40	Shrinkage Reducing	ASTM C 494, Type S
Sika Control 75	Shrinkage Reducing	ASTM C 494, Type S
Sika ViscoFlow-2020	Slump Retaining	ASTM C 494, Type S
Sika Watertight Concrete Powder	Permeability Reducing	ASTM C 494, Type F & S
Sika Stabilizer 300 SCC	Viscosity Modifying	ASTM C 494, Type S
Sika-CNI	Corrosion Inhibitor	ASTM C 1582
Sikacrete-950DP	Silica Fume	ASTM C 1240
Sika Lightcrete Powder	Flowable Fill Admixture	n/a

All admixtures must be batched according to the manufacturer recommendations. For more information please refer to the Technical Data Sheets available at www.usa.sika.com.

In case of any further questions, please feel free to contact me.

NO OTHER WARRANTIES, EXPRESSED OR IMPLIED, SHALL APPLY INCLUDING ANY WARRANTY OF MERCHANTABILITY OR FITNESS FOR A PARTICULAR PURPOSE. SIKA SHALL NOT BE LIABLE UNDER ANY LEGAL THEORY FOR SPECIAL OR CONSEQUENTIAL DAMAGES OF ANY KIND. SIKA SHALL NOT BE RESPONSIBLE FOR THE USE OF THIS PRODUCT IN A MANNER TO INFRINGE ON ANY PATENT OR ANY OTHER INTELLECTUAL PROPERTY RIGHTS HELD BY OTHERS.

Respectfully,



Nathaniel Artman, EI
Concrete Specialist

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SAFETY DATA SHEET

MATERIAL: READY MIX CONCRETE

Section 1 – Product Identification

Product Identifier

Product Name: Ready Mix Concrete

Product Codes: Ready mix, RMX

(This SDS covers many products. Individual constituents will vary.)

Synonyms: Ready mix, Concrete mix, Poured concrete

Product Form: Solid blend

Intended Use of Product: Typically used as a structural construction component or adjunct

Name, Address and Telephone of Responsible Party

Aggregate Industries (US)
24 Crosby Drive
Bedford, MA 01730
(888) 646-5246

Emergency Contact Information:

CHEMTREC: 1-800-424-9300

Section 2 – Hazards Identification

Classification of the Substance or Mixture

Classification (GHS-US)

Skin Corrosion 1B
Eye Damage 1
Skin Sensitizer 1B
Carcinogen 1A
Specific Target Organ Toxicity: Single Exposure (Lungs) 3
Specific Target Organ Toxicity: Repeat Exposure (Lungs) 3

Label Elements

Hazard Pictograms



Signal Word

Danger

Hazard Statements

Causes severe skin burns and eye damage
May cause an allergic skin reaction
May cause respiratory irritation
May cause cancer (inhalation)

Precautionary Statements

- | | |
|-------------------|---|
| Prevention | Do not breathe dust.
Wear protective gloves/protective clothing/eye protection/face protection
Wash thoroughly after handling. |
| Response | Do not handle until all safety precautions have been read and understood.
If inhaled: Remove person to fresh air and keep comfortable for breathing. Immediately call a poison center/doctor.
If in eyes: Rinse cautiously with water for several minutes. Remove contact lenses, if present and easy to do. Continue rinsing. Immediately call a doctor.
If on skin: Take off immediately all contaminated clothing. Rinse skin with water. Wash contaminated clothing before reuse.
If swallowed: Rinse mouth. Do NOT induce vomiting. Immediately call a poison center/doctor. |
| Storage | Store locked up. |
| Disposal | Dispose of contents/container in accordance with local/state/national regulations. |

Other Hazards

Exposure may aggravate those with pre-existing eye, skin or respiratory conditions or illness.
Contact with wet material may cause irritation and chemical (caustic) burns on exposed skin (see Section 16 for additional information).

Section 3 – Composition/Information on Ingredients

Component/Ingredient	CAS #	Percent Present (Range)
Portland cement	65997-15-1	10 - 30
Calcium hydroxide	1305-62-0	15 - 25
Fly Ash*	68131-74-8	0 - 20
Sand (may be composed of varying granitic and silicate materials)	None	0 - 90
Limestone	1317-65-3	25 - 65
Calcium oxide	1305-78-8	0 - 5
Magnesium oxide	1309-48-4	0 - 4
Nuisance Dusts (Particulates not otherwise regulated)	None	< 1 - 5
Crystalline Silica (quartz – respirable)	68131-74-8	0 < 1

Other Components

Ready mix concrete is made primarily from materials mined from the earth. A chemical analysis of the material may reveal trace amounts of naturally occurring but potentially harmful chemical compounds such as organic compounds, potassium and sodium compounds, and heavy metals including cadmium, chromium (including hexavalent chromium), nickel and lead. See Section 16 for additional information.

* Fly ash is a by-product of coal combustion and is primarily composed of silicates and metallic oxides. The exact composition will vary depending on the source of the coal.

Section 4 – First Aid Measures

Description of First Aid Measures

- Eyes** Rinse eyes and under lids cautiously with clean water for at least 15 minutes. Remove contact lenses, if present and easy to do. Continue rinsing. Get immediate medical advice/attention.
- Skin** Remove contaminated clothing. Remove dry material from skin, but avoid creating dust. Wash with plenty of water. If skin irritation occurs, get immediate medical advice/attention.
- Inhalation** Remove person to fresh air away from dust and keep comfortable for breathing. If coughing persists, obtain medical attention.
- Ingestion** Do not induce vomiting. If subject is conscious, rinse the mouth with water to remove any material and drink plenty of water to dilute any swallowed material. Do not give drink or attempt to force water to an unconscious person. Get medical advice/attention.

Important Symptoms and Effects (Acute and Delayed)

- Eyes** Causes serious eye irritation and may scratch eye surface due to particle abrasion. May cause chemical burns resulting in corneal damage.
- Skin** Causes skin irritation if exposed to moisture on skin creating redness, dryness and itching. Extended exposure to wet material will result in chemical burns to skin, possibly severe.
- Inhalation** May irritate nose and throat if dust is inhaled. Prolonged or repeated inhalation of respirable dust may lead to respiratory tract or lung damage.
- Ingestion** May cause irritation and burns of mouth, throat, stomach and digestive tract if swallowed.

Recommendations for Immediate Medical Care or Special Treatment

Seek immediate medical attention for inhalation of large quantities of dust or exposure of wet material over large areas of skin.
Seek immediate medical attention if material comes into contact with eyes and cannot be immediately removed.

Section 5 – Fire Fighting Measures

- General Fire Hazards** None. Material is not considered flammable or combustible.
- Extinguishing Media** Use water or water spray to extinguish any fires involving this material.
- Extinguishing Media to Avoid** None.
- Hazards of Combustion** None.
- Fire Fighting Recommendations** Firefighters should always wear full protective gear to fight any fire.
Refer to Section 9 for flammability information.

Section 6 – Accidental Release Measures

- Precautions** Avoid creating dust. Prevent material from entering sewers, drains, ditches or waterways.
- Personal Protection** Wear respiratory protection and protective eyewear/clothing to avoid eye or skin contact.

Emergency Procedures

Ventilate area and avoid creating dust. Remove unnecessary persons from area.

Containment Procedures

Barricade solid material to prevent additional spillage.

Clean Up Procedures

Scoop or vacuum up spilled material while avoiding dust creation. Scoop up wet material and place in approved container. Allow wet material to harden before disposal.

Section 7 – Handling and Storage**Safe Handling Practices**

Avoid contact with skin or eyes. Avoid breathing dust. Use only in well ventilated areas. Wear appropriate personal protective equipment to prevent eye or skin contact and use respiratory protection equipment if dusty or in poorly ventilated areas.

Safe Storage Measures

Store in well-ventilated areas away from moisture and incompatible materials. If stored in containers, keep containers closed when not in use.

Incompatible Materials

Water/moisture exposure will cause material to generate heat. Keep away from fluoride compounds, strong acids, aluminum, and oxidizers. Cement dissolves in hydrofluoric acid, producing corrosive silicon tetrafluoride gas.

Section 8 – Exposure Controls & Personal Protection**Exposure Limits for Individual Components** (T= Total Respirable, R=Respirable fraction, I=Inhalable-aerosol)

Component	OSHA PEL	ACGIH TLV	NIOSH REL
Portland cement	15 mg/m ³ (T); 5 mg/m ³ (R)	1 mg/m ³ (R)	10 mg/m ³ (T); 5 mg/m ³ (R)
Calcium hydroxide	5 mg/m ³	5 mg/m ³	5 mg/m ³
Fly ash	15 mg/m ³ (T); 5 mg/m ³ (R)	10 mg/m ³ (T); 3 mg/m ³ (R)	Not established
Limestone	15 mg/m ³ (T); 5 mg/m ³ (R)	Not established	10 mg/m ³ (T); 5 mg/m ³ (R)
Calcium oxide	5 mg/m ³	2 mg/m ³	2 mg/m ³
Magnesium oxide	15 mg/m ³ (T); 5 mg/m ³ (R)	10 mg/m ³	Not established
Nuisance Dusts (PNOR)	15 mg/m ³ (T); 5 mg/m ³ (R)	10 mg/m ³	Not established
Crystalline Silica (Quartz)	10 mg/m ³ (R) /(% SiO ₂ + 2) 30 mg/m ³ (T) /(% SiO ₂ + 2)	0.025 mg/m ³ (R)	0.05 mg/m ³ (R)

Exposure Controls**Engineering Controls**

Use outdoors in well-ventilated areas; otherwise employ natural or mechanical ventilation to maintain exposure within applicable limits.

Personal Protection**Face and Eyes**

Avoid contact with skin or eyes. Avoid creating or breathing dust.

Safety glasses with side shields or protective goggles should be worn while using this product. For extremely dusty conditions, non-vented goggles or goggles with indirect venting are recommended. Avoid contact lens wear when using this product.

Body

Long sleeved shirts and trousers should be worn while using this material. Wear water-proof boots. If working in dusty conditions, impervious over garments are recommended.

Respiratory

If exposure levels cannot be maintained below acceptable limits, suitable particulate-filtering facemasks or respirators approved by MSHA/NIOSH should be worn in accordance with the user's respiratory protection program and OSHA/MSHA guidelines.

Hands

Protective gloves with wrist/arm cuffs should be worn to avoid direct contact with skin.

Section 9 – Physical and Chemical Properties

Physical State	Gray, flowable semi-fluid	Specific Gravity	1.9 – 2.4
Appearance & Color	Grey/off-white paste	Flash Point/Method	None. Not flammable.
Odor	None	Auto Ignition Temperature	Not determined
pH	>12	Lower Flammability Limit	Not applicable
Boiling Point	> 1000 °C (> 1832 °F)	Upper Flammability Limit	Not applicable
Solubility (Water)	Slight (<5%)	Octanol/H₂O Coefficient	Not determined
Evaporation Rate	Not applicable	Viscosity	Varies accord to mixture
Melting Point	Not determined	Freezing Point	Not determined
Vapor Density	Not applicable	Explosion Risk: Static	Not considered a hazard
Vapor Pressure	Not applicable	Explosion Risk: Shock	Not considered a hazard

Section 10 – Stability and Reactivity**Reactivity**

Dry powder reacts with water to create heat and calcium hydroxide.

Chemical Stability

Stable at standard temperature and pressures.

Hazardous Reactions	None. Hazardous polymerization will not occur.
Conditions to Avoid	Moisture or wetting powder will cause exothermic heating as product cures.
Incompatible Materials	Avoid contact with strong acids, oxidizers, aluminum and ammonium salts.
Decomposition Hazards	Reacts with water to form calcium hydroxide which can irritate/damage skin. Cement dissolves in hydrofluoric acid, producing corrosive silicon tetrafluoride gas.

Section 11 – Toxicological Information

Product: Ready mix concrete

Acute Toxicity	Not classified.
LD50/LC50 Data	Not classified.
Skin Corrosion/Irritation	Causes irritation or chemical burns if exposed to skin.
Critical Eye Damage/Irritation	Causes serious eye injury due to chemical burns or mechanical irritation.
Respiratory or Skin Sensitization	May cause an allergic skin reaction in some individuals.
Germ Cell Mutagenicity	Not reported/no data available.
Teratogenicity	Not reported/no data available.
Carcinogenicity	Material contains trace amounts of respirable crystalline silica, which may cause lung cancer through repeated or prolonged exposure to dust.
Specific Organ Toxicity (Single Exposure)	May cause respiratory irritation.
Specific Organ Toxicity (Repeated Exposure)	May cause damage/disease to lungs through repeated or prolonged exposure.
Reproductive Toxicity	Not reported/no data available.
Aspiration Respiratory Hazard	Not reported/no data available.
Symptoms: Inhalation	Coughing, sneezing, mucous discharge and dyspnea. Extended contact may lead to chemical burns to mucous membranes.
Symptoms: Skin Contact	Redness and itching. Extended contact may lead to chemical burns.
Symptoms: Eye Contact	Redness and itching. Extended contact may lead to corneal ulceration and burns.
Symptoms: Ingestion	Irritation and chemical burns of mouth and throat.
Other Toxicological Information	No additional data available.

Components	Toxicity	Carc: IARC	Carc: NTP	Carc: OSHA
Portland cement (refer to Section 16 for more information)	No data	Not listed	Not listed	Not listed
Calcium hydroxide	Oral LD50 Rat 7340 mg/kg	Not listed	Not listed	Not listed
Fly ash	Oral LD50 Rat > 2000 mg/kg	Not listed	Not listed	Not listed
Limestone	No data	Not listed	Not listed	Not listed
Calcium oxide	LC50 (Fish) 1070 mg/l	Not listed	Not listed	Not listed
Magnesium oxide	No data	Not listed	Not listed	Not listed
Nuisance dusts (PNOR)	No data	Not listed	Not listed	Not listed
Crystalline Silica (Quartz) (refer to Section 16 for more information)	Oral LD50 Rat >22,500 mg/kg LC50 Carp >10,000 mg/L (72 hr)	Group 1	Known	Not listed

Section 12 – Ecological Information

General Ecotoxicity	Not classified.
Persistence and Degradability	Not reported/no data available.
Bioaccumulation Potential	Not reported/no data available.
Mobility in Soil to Groundwater	Not reported/no data available.
Environmental Fate	Not reported/no data available.
Other Environmental Precautions or Information	Avoid release to the environment. Prevent material from entering sewers, drains, ditches or waterways.

Section 13 – Disposal Considerations

Disposal Methods	Dispose as an inert, non-metallic mineral in accordance with applicable federal, state, and local regulations. Allow wet material to harden before disposal.
Special Considerations	Avoid creation or breathing dust during disposal. Avoid contact with skin and eyes. Refer to Section 8 for personal protection measures.
Other Disposal Information	Prevent material from entering sewers, drains, ditches or waterways.

Section 14 – Transport Information

Proper Shipping Name	N/A – not regulated.
Hazard Class	N/A – not regulated.
UN Shipping ID Number	N/A – not regulated.
Packing Group	N/A – not regulated.
Environmental/IMDG Codes	N/A – not regulated.

Section 15 – Regulatory Information

Federal

This product contains one or more chemical components or ingredients that may require identification and/or reporting under SARA Section 302, SARA Section 311/312/313, CERCLA and/or TSCA. An examination of the components of this product should be conducted by a qualified environmental professional to determine if such identification or reporting is required by federal law.

- Components: Portland cement, Silica (Crystalline), Calcium hydroxide, Calcium oxide, Magnesium oxide, Limestone

State

This product contains one or more chemical components or ingredients that are included or listed on the hazardous substances lists for one or more of the following states: California, Maine, Massachusetts, Minnesota, New Jersey, Pennsylvania and Rhode Island. An examination of the components of this product should be conducted by a qualified environmental or safety and health professional to determine the specific requirements for those states.

- Components: Portland cement, Silica (Crystalline), Calcium hydroxide, Calcium oxide, Magnesium oxide, Limestone

The state of California requires the following statement (Proposition 65) in regards to this material:

- WARNING! This product contains chemicals known to the state of California to cause cancer, birth defects or other reproductive harm.

Section 16 – Other Information

Date of last revision: September 18, 2015

Prepared and reviewed by: Holcim (US) Inc. Occupational Safety & Health

Additional information regarding portland cement:

Wet portland cement can cause caustic burns to unprotected skin, sometimes referred to as cement burns. Cement burns may result in blisters, dead or hardened skin, or black or green skin. In severe cases, these burns may extend to the bone and cause disfiguring scars or disability.

Employees cannot rely on pain or discomfort to alert them to cement burns because cement burns may not cause immediate pain or discomfort. By the time an employee becomes aware of a cement burn, much damage has already been done. Accordingly, the safest method to use portland cement is to avoid contact with exposed skin completely. Cement burns can get worse even after skin contact with cement has ended. Any employee experiencing a cement burn is advised to see a health care professional immediately.

Skin contact with wet portland cement can also cause inflammation of the skin, referred to as dermatitis. Signs and symptoms of dermatitis can include itching, redness, swelling, blisters, scaling, and other changes in the normal condition of the skin. Contact with wet portland cement can cause a non-allergic form of dermatitis (called irritant contact dermatitis) which is related to the caustic, abrasive, and drying properties of portland cement.

In addition, hexavalent chromium [Cr(VI)] which may be found in portland cement in trace amounts, can cause an allergic form of dermatitis (allergic contact dermatitis, or ACD) in sensitized employees who work with wet portland cement. When an employee is sensitized, that person's immune system overreacts to small amounts of Cr(VI), which can lead to severe inflammatory reactions upon subsequent exposures. Sensitization may result from a single Cr(VI) exposure, from repeated exposures over the course of months or years, or it may not occur at all. After an employee becomes sensitized, brief skin contact with very small amounts of Cr(VI) can trigger ACD. ACD is long-lasting and employees can remain sensitized to Cr(VI) years after their exposure to portland cement has ended. Medical tests (e.g. skin patch tests) are available that can confirm whether an employee has become dermally sensitized to Cr(VI).

Employees who work with wet portland cement and experience skin problems, including seemingly minor ones, are advised to see a health care professional for evaluation and treatment. In cement-related dermatitis, early diagnosis and treatment can help prevent chronic skin problems.

Additional information regarding crystalline silica:

The major concern is silicosis, caused by the inhalation and retention of respirable (extremely small) crystalline silica dust particles. Silicosis can exist in several forms. Chronic or ordinary silicosis (often referred to as simple silicosis) is the most common form of silicosis, and can occur after many years of exposure to relatively low concentrations of airborne respirable crystalline silica dust. Complicated silicosis or progressive massive fibrosis (PMF) may be associated with decreased lung function and may be disabling. Advanced complicated silicosis or PMF may lead to death. Advanced complicated silicosis or PMF can result in heart disease secondary to the lung disease. Acute silicosis can occur with exposures to very high concentrations of respirable crystalline silica over a very short time period, sometimes as short as a few months. The symptoms of acute silicosis include progressive shortness of breath, fever, cough and weight loss. Acute silicosis can be fatal.

IARC: The overall IARC evaluation was that "crystalline silica inhaled in the form of quartz or cristobalite from occupational sources is carcinogenic to humans (Group 1)." The IARC evaluation noted that "carcinogenicity was not detected in all industrial circumstances studies. Carcinogenicity may be dependent on inherent characteristics of the crystalline silica or on external factors affecting its biological activity or distribution of its polymorphs."

NTP: The National Toxicology Program (NTP), in its Thirteenth Annual Report on Carcinogens, classified "silica, crystalline (respirable)" as a known human carcinogen.

OSHA: Crystalline silica (quartz) is not regulated as a human carcinogen by the Occupational Safety and Health Administration.

Other important information:

While the information provided in this document is believed to provide a useful summary of the hazards of portland cement, the information in this document cannot anticipate and provide all of the information that might be needed in every situation. Inexperienced product users should obtain proper training before using this product.

The data furnished in this document do not address hazards that may be posed by other materials when mixed with portland cement. Users should review other relevant safety data sheets before working with this product.

The information presented in the Safety Data Sheet is based on current knowledge and publications and is intended to describe the product for the purposes of health, safety and environmental requirements only. It should not be interpreted as guaranteeing any specific property of the product.

SELLER MAKES NO WARRANTY, EXPRESSED OR IMPLIED, CONCERNING THE PRODUCT OR THE MERCHANTABILITY OR FITNESS THEREOF FOR ANY PURPOSE OR CONCERNING THE ACCURACY OF ANY INFORMATION PROVIDED BY HOLCIM (US) INC., EXCEPT THAT THE PRODUCT SHALL CONFORM TO CONTRACTED SPECIFICATIONS.

--END OF SAFETY DATA SHEET--



CRMCA Concrete Quality Pre-Construction Checklist

www.crmca.org

Project Information

Project Name: _____ Location: _____

Project Representatives:

Owner: _____ Architect: _____
 Structural Engineer: _____ Construction Manager: _____
 General Contractor: _____ Concrete Supplier: _____
 Testing Agency: _____ Other: _____

Concrete Mixture Design Submittals

Mixture Usage	Mixture Code	Special Attributes	Mixture Design Specifications				Approved Y/N
			Strength @ __ d	Max. w/cm	Slump (in.)	Air (%)	

Special Attribute Codes:

- | | | | | | |
|-------|--------------------|-----|----------------------|------|---------------------------------|
| AE | Air Entrained | CLR | Color Addition | NCA | Non-Chloride Acceleration |
| NAE | Non-Air Entrained | CI | Corrosion Inhibiting | SF | Silica Fume |
| LTWT | Lightweight Agg. | SRA | Shrinkage Reduction | UFFA | Ultra Fine Fly Ash |
| SCC | Self-Consolidating | FP | Fiber Product | HVWT | Heavy Weight Aggregate |
| HRWR | High Range WRA | HE | High Early Strength | RET | Retardation/ Hyd. Stabilization |
| Other | | | | | |

Concrete Quality Control/ Assurance

Independent Testing Laboratory CCRL/AMRL* accredited including C1077? (Circle Yes or No)

*CCRL Lab Listing	AMRL Listing	<u>Name & Certification #</u>
ACI Concrete Strength Testing Technician	_____	_____
ACI Field Testing Technician(s)	_____	_____
ACI Certification can be obtained by contacting the CRMCA at	_____	_____
www.crmca.org	_____	_____

ACI Certification Verification Link

Contractor's Responsibilities in accordance with ACI 301-10 Section 1.6.2

- Allow access to the project site or to the source of materials and assist Owner's testing agency in obtaining and handling samples at the project site or at the source of materials.
- Advise Owner's testing agency at least 24 hours in advance of operations to allow for scheduling of quality assurance tests, review of project requirements, and for the assignment of personnel.
- Provide space and source of electrical power on the project site for facilities to be used for initial curing of concrete test specimens as required by ASTM C31 for the sole use of Owner's quality assurance testing agency.



CRMCA Concrete Quality Pre-Construction Checklist

Who's responsible for providing specimen storage water tank or box? _____

Who's responsible for maintaining the temperature of the storage environment? _____

Note 5: ASTM C31 states, "Immediately after molding and finishing, the specimens shall be stored for a period up to 48h in a temperature range from 60 and 80 F and in an environment preventing moisture loss from the specimens. For concrete mixtures with a specified strength of 6000 psi or greater, the initial curing temperature shall be between 68 and 78 F." ASTM C31 also states, "The storage temperature shall be controlled by use of heating and cooling devices, as necessary. Record the temperature using a maximum-minimum thermometer."

Note 6: ASTM C31 states, "Upon completion of initial curing and within 30 min after removing the molds, cure specimens with free water maintained on their surfaces at all times at a temperature of 73.5 +/- 3.5 F. ..."

Transportation of Specimens to the Laboratory

ASTM C31, Section 11.1 states, " Specimens shall not be transported until at least 8 h after final set. During transporting, protect the specimens with suitable cushioning material to prevent damage from jarring. During cold weather, protect the specimens from freezing with suitable insulation material. Prevent moisture loss during transportation by wrapping the specimens in plastic, wet burlap, by surrounding them with wet sand, or tight fitting plastic caps on plastic molds. Transportation time shall not exceed 4 h."

When will specimens, cast on days preceding non-work days, be transported to the laboratory?

Please explain: _____

Field Curing Method:	(Form or Shoring Removal but not Acceptance)	(Circle Yes or No)
Storage under conditions consistent with concrete in the structure		yes no
Maturity		yes no

Acceptance Criteria for Hardened Concrete (ACI 301/318)

In accordance with ACI 301-10, the Owner's testing agency will report results to the Owner, Architect/ Engineer, Contractor, and concrete supplier within 7 days of testing. ACI 301 also requires that the testing agency issue a report immediately, to these parties when it appears that furnished material is not in compliance with the specifications. Test results from standard molded and cured strength specimens will be evaluated separately for each concrete mixture. Evaluation is valid only if tests have been conducted in accordance with specified procedures. Validation of of tests not conducted in accordance with specified procedures will be the responsibility of the Owner's testing agency.

Acceptance of Concrete Strength in accordance with ACI 301-10

The strength of standard molded and cured strength specimens is satisfactory if the following criteria are met:

- 1.6.6.1 a Every average of three consecutive strength tests equals or exceeds the specified compressive strength f_c .
- 1.6.6.1 b No strength test result falls below f_c by more than 500 psi when f_c is 5000 psi or less, or by more than 0.10 f_c when f_c is more than 5000 psi.



CRMCA Concrete Quality Pre-Construction Checklist

Coring

Section 1.6.6.2- The strength of concrete in the area represented by cores, tested in accordance with ASTM C42, is considered adequate when the average compressive strength of the cores is at least 85% of f_c and if no single core is less than 75% of f_c .

Statement of Acknowledgement

The American Concrete Institute (ACI) and the ASTM International have established many standards and practices related to the performance and safety of concrete construction. The quality of concrete construction is heavily dependent upon the commitment of the project team to the standard practices associated with the production, delivery, placement, and testing of ready mixed concrete. We believe the information in this document accurately reflects the discussion(s) between all attendees.

	(Circle Yes or No)			(Circle Yes or No)	
Owner:	Yes	No	Architect:	Yes	No
Structural Engineer:	Yes	No	Construction Manager:	Yes	No
General Contractor:	Yes	No	Concrete Supplier:	Yes	No
Owners Testing Agency:	Yes	No	Testing Agency:	Yes	No

Email Address of Attendees:

Owner: _____

Architect: _____

Structural Engineer: _____

Construction Manager: _____

General Contractor: _____

Concrete Supplier: _____

Owners Testing Agency: _____

Testing Agency: _____

Notes or Comments: